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EXAMINER	
WANG, JIN CHENG	
ART UNIT	**PAPER NUMBER**
2628	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/775,918	KAZI ET AL.	
	Examiner	Art Unit	
	Jin-Cheng Wang	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-23 and 25-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-23, 25-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed 9/20/2006 and 11/20/2006 have been entered. Claims 1 and 23 have been amended. Claims 2 and 24 have been canceled. Claims 1, 3-23, 25-44 are pending in the application.

Response to Arguments

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection set forth in the present Office Action based on Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Huissoon U.S. Patent No. 6,044,308 (hereinafter Huissoon) and Roos U.S. Patent No. 6,615,112 (hereinafter Roos).

Applicant's arguments filed 9/20/2006 have been considered and are not found persuasive in view of the cited prior art of record.

Applicant argues on Page 13 that the present invention provides a method for displaying "abstract information that is not visible to the user" so that the user has a visual representation of the robot-specific conditions actually occurring. Applicant argues displaying abstract information that is not visible to the user. It is rather bazaar how abstract information that is not visible to the

user can be displayed. Applicant's argument is also in contrary to the claimed invention in which the robot-specific information is faded over the image of the real environment.

Applicant also argues the present invention fades in a system of coordinates over a real environment image. It is not clear how a system of coordinates can be faded over a real environment image. The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or work-piece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by claim limitation of at least one robot-specific coordinate system being faded into or displayed/superimposed over said image of the real environment. In view of the cited prior art, Watanabe further discloses a plurality of coordinate systems including the world coordinate system and the coordinates of the positions of the working path-workpiece coordinate systems are detected and superimposed on the image of the reference work; e.g., **column 12, lines 10-21**.

Applicant argues that Watanabe does not teach the claim limitation of robot-specific information set forth in the claim 1. However, in contrary to the applicant's arguments, Watanabe teaches the robot-specific information. Since applicant's robot-specific information takes any of a variety of forms including information related to any robot, it should be given the broadest reasonable interpretation. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Watanabe discloses the working line or the working path of the robot, which is clearly the robot-specific information and it has nothing to do with the work-piece; see column 7, lines 15-35, column 8, lines 45-65 and column 11, lines 55-67 wherein the robot working path constitute the teaching points of the robot to produce the movement path or a motion program of the second robot.

Moreover, the position and orientations of the faces in the vicinity of the working path are robot specific information because the coordinates are measured in reference to the robot coordinate system, especially relative to the second robot.

Moreover, Watanabe further discloses that the position or locus on which a working robot operates is marked on an object to be worked and a position of **the marking on an image of a camera** is detected by means for specifying points constituting a working line and the operator can indicate a correct point to be recognized on the camera image. These points are marked in order for the robot to follow the path and thus are rightfully robot specific information, as opposed to the work-piece related information.

Finally, the working path is clearly faded over the image of the real environment on the viewing device. The image of the camera 2 or 12 is displayed on a screen of the image display device 3 and the detected point positions constituting the working line are displayed while being superimposed on this image. See Watanabe column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-50.

Applicant has not even defined the term "fading" in the specification and the claim. In the absence of any clear meaning of "fading", the term "fading" is given the broadest interpretation consistent with the specification. During patent examination, the claims are

given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis.

Although, it is not clear whether Watanabe discloses providing the viewing device with the image receiving unit, detecting an image of the real environment by the image receiving unit and fading computer-generated information into the image.

However, Huissoon discloses providing the viewing device with the image (e.g., column 6, lines 18-20), detecting an image of the real environment by the image receiving unit (column 6, lines 1-31) and fading computer-generated information into the image (column 6, lines 30-45 and Fig. 5a and 7b).

It would have been obvious to have combined Huissoon and Watanabe because Huissoon teaches other claim limitation set forth in the claim 1 as well. Huissoon teaches the virtual edge shown as the broken lines are "faded" over the topographical features viewed by a structured line sensor wherein the virtual edges are computed generated information as claimed.

Huissoon discloses a determination of a position and an orientation or pose of the reference frame S being the coordinate frame for sensor image frame (column 6, lines 5-10) and that robot-specific information such as the relative pose of the end-point frame E, which is the pose of coordinate frame E of the robot end-point with respect to a global coordinate reference frame of robot, is faded over the sensor image to determine the pose of the sensor frame S with respect to the end-point frame E using sensor measurements of a known fixture in the reference frame R of a calibration feature (column 6, lines 1-16). The tool center point (TCP) with respect

to reference fixture is faded over the sensor image data (See Huissoon column 6, lines 60-67 and column 7, lines 1-8). The TCP is clearly robot-specific information as claimed.

One of the ordinary skill in the art would have been motivated to do so to provide the viewing device for detecting an image of the real environment (Huissoon column 11, lines 4-26) so that the calibration markings can be displayed over the image of the real environment (Roos column 11, lines 40-50).

Claims 1 and 23 are fulfilled by Saito et al. U.S. Patent No. 6,587,752.

Saito discloses a method for fading computer-generated information into an image of the real environment detected by an image receiving unit located on a viewing device, the method comprising the steps of:

Providing the viewing device with the image receiving unit (*e.g., the vision device 44 of column 3 is provided with the viewing device 31*);

Detecting an image of the real environment by the image receiving unit (*e.g., the vision device 44 captures an image of the real environment; see column 3 and column 5, Fig. 6(b)*);

Fading computer generated information into the image (*Fig. 6(b)*), wherein there is a determination of a position and an orientation or pose of the image receiving unit (*e.g., column 3, in accordance with instructions from the operator 5 referring to actual space images obtained from the vision device 44, the three-dimensional image measurement unit 21 measures corresponding spatial locations in the actual space. The relationship between the spatial coordinate system used by the three-dimensional image measurement unit 21 and the tool frame or the tool coordinate system given to the robot hand 42 is assumed to be known by means of*

calibration and therefore there is a determination of a position and an orientation of the image-receiving unit. See Fig. 6(b), column 3 and column 6, lines 45-65 wherein the locations and orientations of tool coordinate system settings are modified and trajectories/paths are readily modified to control the robot motion) and that robot-specific information corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g., Fig. 6(b) wherein the model space image is faded over the image of the real environment on the viewing device. There is a determination of the model space image by the parametric method using the robot-specific information such as the robot constraint conditions*); at least one robot-specific coordinate system being faded into said image of the real environment (*Fig. 6(b) shows the camera image overlaid with an image of the model space wherein at least one robot-specific coordinate system is displayed. The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or workpiece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by a display of at least one robot-specific coordinate system*).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3-23, and 25-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-23, and 25-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. For example, Claim 1 recites "there is a determination of a position and an orientation or pose of the image receiving unit and that robot-specific information corresponding to this determination is faded over the image of the real environment". However, applicant's specification does not support the claim limitation of "robot-specific information corresponding to this determination is faded over the image of the real environment." For example, in the first paragraph of Page 17 (applicant's specification), it is stated, "it is possible to establish the pose of the viewing device 1.1. Additionally or alternatively the pose of the viewing device 1.1 or image receiving device 1.2

can be obtained by a comparison of the camera image with a stored image." The pose of the image receiving device 1.2 is simply obtained, rather than being faded over the image of the real environment. The camera image is compared with a stored image. Having the determination of the pose of the imaging receiving unit does not imply the pose of the image receiving device 1.2 being faded over the image of the real environment.

Claim 1 also recites "at least one robot-specific coordinate system being faded into said image of the real environment." In Page 26-27 of applicant's specification, it is stated, "the augmented workpiece indicates to the user at which point the robot assumes the workpiece to be. If the robot program path does not correspond to the position of the real workpiece (e.g., due to positional tolerance), the user can correct the robot program in that he shifts and rotates the augmented workpiece together with the associated robot program path points until coincidence with the real workpiece is obtained...The augmentation of the workpiece is dependent on the robot path (its position changes e.g., due to the shifting of the corresponding workpiece coordinate system)...instead of a coordinate system the axes A1 to A6 of the robot can be displayed, i.e., they are so faded into the image of the real robot 7 that they coincide with its actual axes in the image." Fading the robot program path over the real workpiece, or shifting of the workpiece coordinate system, or fading the axes A1 to A6 into the image of the real robot 7 is remote from "fading the at least one robot-specific coordinate system into said image of the real environment". There is no indication in any applicant's specification that the robot-specific coordinate system is faded into said image of the real environment.

Claims 3-22 depend upon the claim 1 and are rejected due to their dependency on the claim 1.

Claim 23 also recites "a display of at least one robot-specific coordinate system." In Page 26-27 of applicant's specification, it is stated, "the augmented workpiece indicates to the user at which point the robot assumes the workpiece to be. If the robot program path does not correspond to the position of the real workpiece (e.g., due to positional tolerance), the user can correct the robot program in that he shifts and rotates the augmented workpiece together with the associated robot program path points until coincidence with the real workpiece is obtained...The augmentation of the workpiece is dependent on the robot path (its position changes e.g., due to the shifting of the corresponding workpiece coordinate system)...instead of a coordinate system the axes A1 to A6 of the robot can be displayed, i.e., they are so faded into the image of the real robot 7 that they coincide with its actual axes in the image." Fading the robot program path over the real workpiece, or shifting of the workpiece coordinate system, or fading the axes A1 to A6 into the image of the real robot 7 is remote from "display of at least one robot-specific coordinate system". There is no indication in any applicant's specification that discloses the display of the robot-specific coordinate system.

Claims 25-44 depend upon the claim 23 and are rejected due to their dependency on the claim 23.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3-23, and 25-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For example, the claims 1, 3-23, and 25-44 recite the term "faded over", "faded into" and "faded in", respectively. It is not clear whether they mean, "superimposed" or "displayed". The specification does not describe the term "faded" in any specific way and the specification is a literal translation of a foreign language into English. Clarification is required as to the term "faded".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 23, 25-37, 39, 41-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe).

Re Claim 23:

Watanabe discloses device for visualizing computer-generated information in an image of the real environment, the device comprising:

A display of at least one robot-specific coordinate system (*The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or workpiece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by a display of at least one robot-specific coordinate system." In view of the cited prior art, Watanabe further discloses a plurality of coordinate systems including the world coordinate system and the coordinates of the positions of the working path-workpiece coordinate systems are detected and superimposed on the image of the reference work; e.g., **column 12, lines 10-21***);

An image receiving device (e.g., camera of column 11-13).

A viewing device, a determining means for determining a position and orientation or pose of the image receiving unit (*e.g., the 2-dimensional image pickup device 2 or 12 in Fig. 1 are mounted on the robot and the reference work 7 in the field of view is captured using the camera 12 and the image is display on the image display device 3. A position to be measured by the first robot 5 is pointed on an image using a pointing device 4 and coordinates of the position pointed on the image are stored in the robot controller and thereby obtaining/determining the coordinates of the position. A view line **corresponding** to the position is obtained on the 3-dimensional image and the position and the orientation of the camera 12; column 11-12. Moreover, the 3-dimensional positions of a sequence of the points which constitute the working line thus obtained are utilized as teaching points of the robot and thus constitute the robot specific information as teaching points of the robot to produce the movement path or a motion*

program of the robot 5, see column 7, lines 20-35. It is also disclosed that the orientations of faces in the vicinity of the working line are measured in correspondence to the respective points. The measurement start point is selected on a working line on which an actual working is performed. The robot having the image pickup device 2 or 12 constitutes an image receiving unit) a and that robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60 and column 11, lines 55-67 wherein* ***the robot working path is clearly the robot-specific information, that constitute the teaching points of the robot, which is determined to produce the movement path or a motion program of the second robot***) and by a fading means for fading the determination of corresponding robot-specific information over the image of the real environment on the viewing device (*e.g.,* ***the position or locus on which a working robot operates is marked on an object to be worked and a position of the marking on an image of a camera is detected by means for specifying points constituting a working line and the operator can indicate a correct point to be recognized on the camera image***. *Therefore, the working path is clearly faded over the image of the real environment on the viewing device. The image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-50*).

Watanabe teaches the robot-specific information. Since applicant's robot-specific information takes any of a variety of forms including information related to any robot, it should be given the broadest reasonable interpretation. Although the claims are interpreted in light of

the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Watanabe discloses the working line or the working path of the robot, which is clearly the robot-specific information and it has nothing to do with the work-piece; see column 7, lines 15-35, column 8, lines 45-65 and column 11, lines 55-67 wherein the robot working path constitute the teaching points of the robot to produce the movement path or a motion program of the second robot.

Moreover, the position and orientations of the faces in the vicinity of the working path are robot specific information because the coordinates are measured in reference to the robot coordinate system, especially relative to the second robot.

Moreover, Watanabe further discloses that the position or locus on which a working robot operates is marked on an object to be worked and a position of **the marking on an image of a camera** is detected by means for specifying points constituting a working line and the operator can indicate a correct point to be recognized on the camera image. These points are marked in order for the robot to follow the path and thus are rightfully robot specific information, as opposed to the work-piece related information.

Finally, the working path is clearly faded over the image of the real environment on the viewing device. The image of the camera 2 or 12 is displayed on a screen of the image display device 3 and the detected point positions constituting the working line are displayed while being superimposed on this image. See Watanabe column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-50.

Applicant has not even defined the term "fading" in the specification and the claim. In the absence of any clear meaning of "fading", the term "fading" is given the broadest interpretation consistent with the specification. During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis.

Claim 25:

Watanabe further discloses a plurality of coordinates being faded/superimposed on the reference image and the coordinates are given as coordinates to a tool coordinate system fixed on the distal end portion of the hand of the robot (column 2, lines 40-49).

Claim 26:

Watanabe further discloses the coordinate positions of the working path being faded/superimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

Claim 27:

Watanabe further discloses an image of a control element (working path) of a robot manual programmer (operator) movable in at least two dimensions (either two-dimensional space or three-dimensional space) in faded in /superimposed over the image of the working object (*column 5, lines 10-17 and column 12, lines 45-67*).

Claim 28:

Watanabe further discloses an image of a control element such as a working path of a robot and the orientation of the robot hand are utilized (column 4 and column 7, lines 20-40).

Claim 29:

Watanabe further discloses at least one tool moved by a robot (Figs. 3-5), preferably several robot elements are faded into a working environment of a robot (Figs. 3-5).

Re Claim 30:

Watanabe further discloses teaching an attitude of a tool center point to the robot and a working path in relation to the reference work (column 7-8) and the thinning process of redundant detected points (column 7-8).

Re Claim 31:

Watanabe further discloses an image of a control element (working path) of a robot manual programmer (operator) movable in at least two dimensions (either two-dimensional space or three-dimensional space) in faded in /superimposed over the image of the working object (*column 5, lines 10-17 and column 12, lines 45-67*).

Claim 32:

Watanabe further discloses the coordinate positions of the working path being faded/superimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

Claim 33:

Watanabe further discloses adapting a robot working path to the position of a detected, real work-piece or the working object, a virtual image of the working object with a robot path

adapted thereto is faded in, so that by superimposing the virtual work object image with the image of the real object it is possible to adapt the robot path to be performed to the position of the real working object (column 7-8 and column 12).

Claim 34:

Watanabe further discloses the working area reachable by a robot and/or a permitted operating area is visualized on the viewing device (column 12).

Claim 35:

Watanabe further discloses movement corridors of a robot tool, robot hand and/or further robot elements are visualized on the viewing device (column 5, lines 10-30 and column 12, lines 45-67).

Claim 36:

Watanabe further discloses permanent and/or instantaneous associations of at least one manual programmer of at least one robot are visualized (column 12, lines 45-67).

Claim 37:

Watanabe further discloses the position and orientation of the display are detected by fixed markings in space (column 12, lines 45-67).

Claim 38:

Watanabe further discloses the position and orientation of the viewing device are determined optically (column 12, lines 45-67).

Claim 39:

Watanabe further discloses the robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60*) corresponding

to this determination is faded over the image of the real environment on the viewing device (*e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46*).

Claims 40-44:

Watanabe further discloses the robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60*) corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-15, 17, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Huissoon U.S. Patent No. 6,044,308 (hereinafter Huissoon) and Roos U.S. Patent No. 6,615,112 (hereinafter Roos).

Re Claim 1:

Watanabe discloses method for fading computer-generated information into an image of the real environment detected by an image receiving unit located on a viewing device,

Wherein there is a determination of a position and an orientation or pose of the image receiving unit (*e.g., the 2-dimensional image pickup device 2 or 12 in Fig. 1 are mounted on the robot and the reference work 7 in the field of view is captured using the camera 12 and the image is display on the image display device 3. A position to be measured by the first robot 5 is pointed on an image using a pointing device 4 and coordinates of the position pointed on the image are stored in the robot controller and thereby obtaining/determining the coordinates of the position. A view line* ***corresponding*** *to the position is obtained on the 3-dimensional image and the position and the orientation of the camera 12; column 11-12. Moreover, the 3-dimensional positions of a sequence of the points which constitute the working line thus obtained are utilized as teaching points of the robot and thus constitute the robot specific information as teaching points of the robot to produce the movement path or a motion program of the robot 5, see column 7, lines 20-35. It is also disclosed that the orientations of faces in the vicinity of the working line are measured in correspondence to the respective points. The measurement start point is selected on a working line on which an actual working is performed. The robot having the image pickup device 2 or 12 constitutes an image receiving unit*) and that robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60 and column 11, lines 55-67 wherein* ***the robot working path is clearly the robot-specific information, that constitute the teaching points of the robot to***

produce the movement path or a motion program of the second robot) corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g.,* ***the position or locus on which a working robot operates is marked on an object to be worked and a position of the marking on an image of a camera is detected by means for specifying points constituting a working line and the operator can indicate a correct point to be recognized on the camera image***. *Therefore, the working path is clearly faded over the image of the real environment on the viewing device. The image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-50*); at least one robot-specific coordinate system being faded into said image of the real environment (*The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or workpiece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by claim limitation of at least one robot-specific coordinate system being faded into or displayed/superimposed over said image of the real environment. In view of the cited prior art, Watanabe further discloses a plurality of coordinate systems including the world coordinate system and the coordinates of the positions of the working path-workpiece coordinate systems are detected and superimposed on the image of the reference work; e.g.,* ***column 12, lines 10-21***).

Watanabe teaches the robot-specific information. Since applicant's robot-specific information takes any of a variety of forms including information related to any robot, it should be given the broadest reasonable interpretation. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Watanabe discloses the working line or the working path of the robot, which is clearly the robot-specific information and it has nothing to do with the work-piece; see column 7, lines 15-35, column 8, lines 45-65 and column 11, lines 55-67 wherein the robot working path constitute the teaching points of the robot to produce the movement path or a motion program of the second robot.

Moreover, the position and orientations of the faces in the vicinity of the working path are robot specific information because the coordinates are measured in reference to the robot coordinate system, especially relative to the second robot.

Moreover, Watanabe further discloses that the position or locus on which a working robot operates is marked on an object to be worked and a position of **the marking on an image of a camera** is detected by means for specifying points constituting a working line and the operator can indicate a correct point to be recognized on the camera image. These points are marked in order for the robot to follow the path and thus are rightfully robot specific information, as opposed to the work-piece related information.

Finally, the working path is clearly faded over the image of the real environment on the viewing device. The image of the camera 2 or 12 is displayed on a screen of the image display device 3 and the detected point positions constituting the working line are displayed while being

superimposed on this image. See Watanabe column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-50.

Applicant has not even defined the term "fading" in the specification and the claim. In the absence of any clear meaning of "fading", the term "fading" is given the broadest interpretation consistent with the specification. During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis.

It is not clear whether Watanabe discloses providing the viewing device with the image receiving unit, detecting an image of the real environment by the image receiving unit and fading computer-generated information into the image.

However, Huissoon discloses providing the viewing device with the image (e.g., column 6, lines 18-20), detecting an image of the real environment by the image receiving unit (column 6, lines 1-31) and fading computer-generated information into the image (column 6, lines 30-45 and Fig. 5a and 7b).

It would have been obvious to have combined Huissoon and Watanabe because Huissoon teaches other claim limitation set forth in the claim 1 as well. Huissoon teaches the virtual edge shown as the broken lines are "faded" over the topographical features viewed by a structured line sensor wherein the virtual edges are computed generated information as claimed.

Huissoon discloses a determination of a position and an orientation or pose of the reference frame S being the coordinate frame for sensor image frame (column 6, lines 5-10) and that robot-specific information such as the relative pose of the end-point frame E, which is the

pose of coordinate frame E of the robot end-point with respect to a global coordinate reference frame of robot, is faded over the sensor image to determine the pose of the sensor frame S with respect to the end-point frame E using sensor measurements of a known fixture in the reference frame R of a calibration feature (column 6, lines 1-16). The tool center point (TCP) with respect to reference fixture is faded over the sensor image data (See Huissoon column 6, lines 60-67 and column 7, lines 1-8). The TCP is clearly robot-specific information as claimed.

One of the ordinary skill in the art would have been motivated to do so to provide the viewing device for detecting an image of the real environment (Huissoon column 11, lines 4-26) so that the calibration markings can be displayed over the image of the real environment (Roos column 11, lines 40-50).

Claim 3:

Watanabe further discloses a plurality of coordinates being faded/superimposed on the reference image and the coordinates are given as coordinates to a tool coordinate system fixed on the distal end portion of the hand of the robot (column 2, lines 40-49).

Claim 4:

Watanabe further discloses the coordinate positions of the working path being faded/superimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

Claim 5:

Watanabe further discloses an image of a control element (working path) of a robot manual programmer (operator) movable in at least two dimensions (either two-dimensional

space or three-dimensional space) in faded in /superimposed over the image of the working object (*column 5, lines 10-17 and column 12, lines 45-67*).

Claim 6:

Watanabe further discloses an image of a control element such as a working path of a robot and the orientation of the robot hand are utilized (column 4 and column 7, lines 20-40).

Claim 7:

Watanabe further discloses at least one tool moved by a robot (Figs. 3-5), preferably several robot elements are faded into a working environment of a robot (Figs. 3-5).

Re Claim 8:

Watanabe further discloses teaching an attitude of a tool center point to the robot and a working path in relation to the reference work (column 7-8) and the thinning process of redundant detected points (column 7-8).

Re Claim 9:

Watanabe further discloses an image of a control element (working path) of a robot manual programmer (operator) movable in at least two dimensions (either two-dimensional space or three-dimensional space) in faded in /superimposed over the image of the working object (*column 5, lines 10-17 and column 12, lines 45-67*).

Claim 10:

Watanabe further discloses the coordinate positions of the working path being faded/superimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

Claim 11:

Watanabe further discloses adapting a robot working path to the position of a detected, real work-piece or the working object, a virtual image of the working object with a robot path adapted thereto is faded in, so that by superimposing the virtual work object image with the image of the real object it is possible to adapt the robot path to be performed to the position of the real working object (column 7-8 and column 12).

Claim 12:

Watanabe further discloses the working area reachable by a robot and/or a permitted operating area is visualized on the viewing device (column 12).

Claim 13:

Watanabe further discloses movement corridors of a robot tool, robot hand and/or further robot elements are visualized on the viewing device (column 5, lines 10-30 and column 12, lines 45-67).

Claim 14:

Watanabe further discloses permanent and/or instantaneous associations of at least one manual programmer of at least one robot are visualized (column 12, lines 45-67).

Claim 15:

Watanabe further discloses the position and orientation of the display are detected by fixed markings in space (column 12, lines 45-67).

Claim 17:

Watanabe further discloses the position and orientation of the viewing device are determined optically (column 12, lines 45-67).

Claim 19:

Watanabe further discloses the robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60*) corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46*).

Claims 20-22:

Watanabe further discloses the robot-specific information (*e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60*) corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and* ***the detected point positions constituting the working line are displayed while being superimposed on this image****; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46*).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Huissoon U.S. Patent No. 6,044,308 (hereinafter Huissoon) and Roos U.S. Patent No. 6,615,112 (hereinafter Roos).

Claim 16:

The claims further recite markings are detected by radio receivers. Watanabe, Huissoon and Roos are silent to the claim limitation.

It would have been obvious to have incorporated radio receivers to collect the working path information or to serve as an image pickup device because Watanabe discloses a general image pickup device such as a camera or an optical receiver for collecting the path information (Watanabe Figs. 1-5) and thereby suggesting the claim limitation of an image pickup device such as the radio receivers. Moreover, the radio receiver can be used in replace with the optical receiver as an alternative image and information collection device.

One of the ordinary skill in the art would have been motivated to use an alternative receiver to collect the robot working path information and to pick up the image information when necessary (column 9-10).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Mizuno et al. U.S. Patent No. 5,876,325 (hereinafter Mizuno), Huissoon U.S. Patent No. 6,044,308 (hereinafter Huissoon) and Roos U.S. Patent No. 6,615,112 (hereinafter Roos).

Claim 18:

The claims further recite data spectacles to be worn by a user for displaying the robot information. Watanabe, Huissoon and Roos are silent to the claim limitation.

However, Mizuno discloses HMD for displaying the robot information (Mizuno Fig. 28 and 35).

It would have been obvious to have incorporated HMD to display the robot information because Watanabe discloses a display device connected to the robot for collecting the robot specific information (Watanabe Figs. 1-5) and Mizuno discloses HMD coupled to the robot manipulators for collecting the robot specific information (Mizuno Figs. 28 and 35) and therefore an alternative display device can be used to collect the robot specific information.

One of the ordinary skill in the art would have been motivated to use an alternative display device such as an HMD so that an operator armed with HMD can directly see the work performed while specifying the points along the working path (Watanabe column 12, lines 45-67).

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe).

Claim 38:

The claims further recite markings are detected by radio receivers. Watanabe is silent to the claim limitation.

It would have been obvious to have incorporated radio receivers to collect the working path information or to serve as an image pickup device because Watanabe discloses a general image pickup device such as a camera or an optical receiver for collecting the path information (Watanabe Figs. 1-5) and thereby suggesting the claim limitation of an image pickup device such as the radio receivers. Moreover, the radio receiver can be used in replace with the optical receiver as an alternative image and information collection device.

One of the ordinary skill in the art would have been motivated to use an alternative receiver to collect the robot working path information and to pick up the image information when necessary (column 9-10).

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Mizuno et al. U.S. Patent No. 5,876,325 (hereinafter Mizuno).

Claim 40:

The claims further recite data spectacles to be worn by a user for displaying the robot information. Watanabe is silent to the claim limitation.

However, Mizuno discloses HMD for displaying the robot information (Mizuno Fig. 28 and 35).

It would have been obvious to have incorporated HMD to display the robot information because Watanabe discloses a display device connected to the robot for collecting the robot specific information (Watanabe Figs. 1-5) and Mizuno discloses HMD coupled to the robot manipulators for collecting the robot specific information (Mizuno Figs. 28 and 35) and therefore an alternative display device can be used to collect the robot specific information.

One of the ordinary skill in the art would have been motivated to use an alternative display device such as an HMD so that an operator armed with HMD can directly see the work performed while specifying the points along the working path (Watanabe column 12, lines 45-67).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Saito et al. U.S. Patent No. 6,587,752 (hereinafter Saito).

Re Claim 1:

Saito discloses a method for fading computer-generated information into an image of the real environment detected by an image receiving unit located on a viewing device, the method comprising the steps of:

Providing the viewing device with the image receiving unit (*e.g., the vision device 44 of column 3 is provided with the viewing device 31*);

Detecting an image of the real environment by the image receiving unit (*e.g., the vision device 44 captures an image of the real environment; see column 3 and column 5, Fig. 6(b)*);

Fading computer generated information into the image (*Fig. 6(b)*), wherein there is a determination of a position and an orientation or pose of the image receiving unit (*e.g., column 3, in accordance with instructions from the operator 5 referring to actual space images obtained from the vision device 44, the three-dimensional image measurement unit 21 measures corresponding spatial locations in the actual space. The relationship between the spatial coordinate system used by the three-dimensional image measurement unit 21 and the tool frame*

or the tool coordinate system given to the robot hand 42 is assumed to be known by means of calibration and therefore there is a determination of a position and an orientation of the image-receiving unit. See Fig. 6(b), column 3 and column 6, lines 45-65 wherein the locations and orientations of tool coordinate system settings are modified and trajectories/paths are readily modified to control the robot motion) and that robot-specific information corresponding to this determination is faded over the image of the real environment on the viewing device (*e.g., Fig. 6(b) wherein the model space image is faded over the image of the real environment on the viewing device. There is a determination of the model space image by the parametric method using the robot-specific information such as the robot constraint conditions*); at least one robot-specific coordinate system being faded into said image of the real environment (*Fig. 6(b) shows the camera image overlaid with an image of the model space wherein at least one robot-specific coordinate system is displayed. The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or workpiece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by a display of at least one robot-specific coordinate system*).

Re Claim 23:

Saito discloses device for visualizing computer-generated information in an image of the real environment, the device comprising:

A display of at least one robot-specific coordinate system (*Fig. 6(b) shows the camera image overlaid with an image of the model space wherein at least one robot-specific coordinate system is displayed. The claimed language is interpreted in light of applicant's specification. Applicant's specification does not disclose a display of at least one robot-specific coordinate system. Applicant's specification in Fig. 8 discloses some rotation axes relating to the degrees of freedom of the robot. No coordinate axis is disclosed in relation to the world coordinate system or workpiece coordinate system. Because the specification is a literal translation into English, it is not clear what is meant by a display of at least one robot-specific coordinate system*);

An image receiving device (e.g., camera or the vision device 44 of column 3).

A viewing device, a determining means for determining a position and orientation or pose of the image receiving unit (*e.g., column 3, in accordance with instructions from the operator 5 referring to actual space images obtained from the vision device 44, the three-dimensional image measurement unit 21 measures corresponding spatial locations in the actual space. The relationship between the spatial coordinate system used by the three-dimensional image measurement unit 21 and the tool frame or the tool coordinate system given to the robot hand 42 is assumed to be known by means of calibration*) a and that robot-specific information (*e.g., Fig. 6(b), column 3 and column 6, lines 45-65 wherein the locations and orientations of tool coordinate system settings are modified and trajectories/paths are readily modified to control the robot motion*) and by a fading means for fading the determination of corresponding robot-specific information over the image of the real environment on the viewing device (*e.g., Fig. 6(b) wherein the model space image is faded over the image of the real environment on the*

viewing device. There is a determination of the model space image by the parametric method using the robot-specific information such as the robot constraint conditions).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (571) 272-7665. The examiner can normally be reached on 8:00 - 6:30 (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on (571) 272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jcw